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SA

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/085,298	05/27/98	GOLDBERG	R TI-25586

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TEXAS INSTRUMENTS INCORPORATED
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EXAMINER

EATON, K

ART UNIT	PAPER NUMBER
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2823

DATE MAILED:

10/11/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/085,298

Applicant(s)

GOLDBERG, RICHARD TODD

Examiner

Kurt M. Eaton

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2000.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-10, and 13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-10, and 13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
2. ☐ received in Application No. (Series Code / Serial Number) _____.
3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 15) ☐ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4, 7, 8, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nozaki.

In re claim 1, Nozaki shows in Figures 2 and 11, a method of forming a dielectric layer on a silicon containing structure, wherein the method includes the steps of providing, to a silicon containing structure, a gas including nitrogen; heating the silicon containing structure to an elevated temperature greater than 700 °C; and striking a plasma above the silicon containing structure to cause thermal nitridation of a portion of the silicon containing structure. Nozaki discloses wherein the thermally nitrided portion of the silicon containing structure also contains oxygen {column 4, line 16 – column 5, line 58; column 9, lines 28-40}.

Nozaki does not show wherein the nitrogen containing gas also includes oxygen or wherein plasma stricken above the silicon containing structure also causes thermal oxidation of a portion of the silicon containing structure.

It would have been obvious to one of ordinary skill in the art at the time the invention was made that since the thermally nitrided portion of the silicon containing structure also contained oxygen, oxygen must have been incorporated within the nitrogen containing gas and also it would

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have been further obvious that the portion of the silicon containing structure that was thermally nitrided would have been thermally oxidized.

In re claim 2, Nozaki shows wherein the elevated temperature is greater than 900 °C {column 5, lines 5-8}.

In re claim 3, Nozaki shows wherein the elevated temperature is greater than 1,000 °C {column 5, lines 5-8}.

In re claim 4, Nozaki shows wherein the silicon containing structure is a silicon substrate and a gate dielectric is formed from the thermal nitridation and thermal oxidation of the silicon containing structure {column 4, lines 24-26; column 9, line 66 – column 10, line 5}.

In re claims 7, 8, and 13, Nozaki substantially discloses the invention as claimed but fails to show wherein a top structure is formed over the thermally nitrided/oxidized silicon containing structure, wherein the top structure is a gate structure.

It would have been obvious to one of ordinary skill in the art at the time the invention was made that since the thermally nitrided/oxidized portion of the silicon containing structure was formed as a gate dielectric, there would be a reasonable expectation from one of ordinary skill in the art that a gate structure would have been formed over the previously formed thermally nitrided/oxidized portion of the silicon containing structure. Furthermore, the specification contains no disclosure of either the critical nature of the claimed structures or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen structure or upon another variable recited in a claim, the applicant must show that the particular limitations are critical.

3. Claims 5, 7, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nozaki in view of Tseng, as previously applied in the office action mailed 11/17/99.

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Nozaki substantially discloses the invention as claimed but fails to show wherein the silicon-containing structure is a bottom electrode of a storage capacitor of a memory device and the nitrided/oxidized portion of the silicon-containing structure is a capacitor dielectric; and forming a top structure over the capacitor dielectric.

Tseng teaches that a dielectric layer containing silicon nitride and silicon oxide may be formed over a bottom electrode of a storage capacitor of a memory device wherein the bottom electrode is made of silicon containing material. Tseng also teaches wherein a top structure is formed over the dielectric {column 8, lines 15-19}.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the thermally nitrided and oxidized silicon containing material of Nozaki such that it was a capacitor dielectric between a bottom electrode of a storage capacitor of a memory device and a top structure as in Tseng since, as evidenced by Tseng, silicon containing bottom structures formed as bottom electrodes for storage capacitors with dielectric layers formed of silicon nitride overlying then is well known in the art. Furthermore, the specification contains no disclosure of either the critical nature of the claimed structures or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen structure or upon another variable recited in a claim, the applicant must show that the particular limitations are critical.

Response to Arguments

4. Applicant's arguments with respect to claims 1-5, 7-10, and 13 have been considered but are moot in view of the new ground(s) of rejection as necessitated by applicants instant amendment.


Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

6. Paper related to this application may be submitted directly to Art Unit 2823 by facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823 Fax Center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2823 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

Any inquiry concerning this communication of earlier communication from the examiner should be directed to **Kurt Eaton** at **(703) 305-0383** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via kurt.eaton@uspto.gov.


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